# Complete Summary

## GUIDELINE TITLE

Treatment of acute exacerbation of asthma.

## BIBLIOGRAPHIC SOURCE(S)

Finnish Medical Society Duodecim. Treatment of acute exacerbation of asthma. In: EBM Guidelines. Evidence-Based Medicine [Internet]. Helsinki, Finland: Wiley Interscience. John Wiley & Sons; 2007 Apr 11 [Various].

## GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Finnish Medical Society Duodecim. Treatment of acute exacerbation of asthma. In: EBM Guidelines. Evidence-Based Medicine [Internet]. Helsinki, Finland: Wiley Interscience. John Wiley & Sons; 2004 Apr 8 [Various].

## COMPLETE SUMMARY CONTENT



## SCOPE

### DISEASE/CONDITION(S)

Acute exacerbation of asthma

### GUIDELINE CATEGORY

Evaluation
Management
Treatment

## CLINICAL SPECIALTY

Allergy and Immunology
Emergency Medicine
Family Practice
Internal Medicine
Pulmonary Medicine

## INTENDED USERS

Health Care Providers
Physicians

## GUIDELINE OBJECTIVE(S)

Evidence-Based Medicine Guidelines collect, summarize, and update the core clinical knowledge essential in general practice. The guidelines also describe the scientific evidence underlying the given recommendations.

## TARGET POPULATION

Patients with acute exacerbation of asthma

## INTERVENTIONS AND PRACTICES CONSIDERED

### Evaluation

1. Assess signs and symptoms including respiratory symptoms, heart rate, peak expiratory flow (PEF), oxygen saturation, response to treatment, cyanosis, bradycardia, hypotension, exhaustion, confusion, unconsciousness
2. Tests, as indicated, such as arterial blood gas analysis, pulse oximetry, theophylline concentration, electrocardiogram (ECG), chest x-ray, serum haematocrit, potassium and blood glucose.

### Management/Treatment

1. Place patient in a comfortable sitting position
2. Oxygen
3. Salbutamol aerosol (or fenoterol) and ipratropium bromide
4. Theophylline in select circumstances
5. Corticosteroid
6. Magnesium sulphate
7. Fluids
8. Sedative drugs in select circumstances
9. Beta agonists
10. Intensive care, if needed
11. Post-hospital patient discharge preparation including provision of medications (oral steroid, inhalable anti-inflammatory drug, inhalable beta sympathomimetic drug), instruction in correct inhaler technique, scheduled follow-up appointment.

**Note**: Guideline developers considered but did not recommend patting physiotherapy. They also considered but did not recommend antimicrobial drugs if no signs of bacterial infection are present.

### MAJOR OUTCOMES CONSIDERED

- Pulmonary function (peak flow, forced expiratory volume)
- Relapse rates
- Hospital admission rates
- Effectiveness of treatment
- Length of stay in emergency department
- Adverse effects of medications

## METHODOLOGY

### METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

### DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The evidence reviewed was collected from the Cochrane database of systematic reviews and the Database of Abstracts of Reviews of Effectiveness (DARE). In addition, the Cochrane Library and medical journals were searched specifically for original publications.

### NUMBER OF SOURCE DOCUMENTS

Not stated

### METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

### RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

**Levels of Evidence**

A. **Quality of Evidence: High**

Further research is very unlikely to change confidence in the estimate of effect

- Several high-quality studies with consistent results
- In special cases: one large, high-quality multi-centre trial

B. **Quality of Evidence: Moderate**

Further research is likely to have an important impact on confidence in the estimate of effect and may change the estimate.

- One high-quality study
- Several studies with some limitations

C. **Quality of Evidence: Low**

Further research is very likely to have an important impact on confidence in the estimate of effect and is likely to change the estimate.

- One or more studies with severe limitations

D. **Quality of Evidence: Very Low**

Any estimate of effect is very uncertain.

- Expert opinion
- No direct research evidence
- One or more studies with very severe limitations

## METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

## DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

## METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

## RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

## COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

## METHOD OF GUIDELINE VALIDATION

Peer Review

## DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not stated

## RECOMMENDATIONS

### MAJOR RECOMMENDATIONS

The levels of evidence [A-D] supporting the recommendations are defined at the end of the "Major Recommendations" field.

#### Basic Rules

- The patient, family members, and the physician often underestimate the severity of an acute exacerbation of asthma.
- The aim of the treatment is
    - To prevent asthma deaths
    - To restore the condition and the pulmonary functions of the patient to a satisfactory level as soon as possible
    - To maintain an optimal functional status and to prevent a recurrence of the exacerbation

#### Recognition of an Acute Exacerbation of Asthma

- Occurrence of even one of the following signs means that the attack is severe:
    - Wheezing and dyspnoea have increased so that the patient cannot finish one sentence without stopping for breath, or cannot stand up from a chair.
    - Respiratory frequency is constantly 25/minute (min) or more.
    - Heart rate is constantly 110/min or more (>30 min after salbutamol inhalation).
    - Peak expiratory flow (PEF) is less than 40% of the best previous value, or below 200 L/min, if the best previous value is not known.
    - Oxygen saturation is below 92%.
    - The condition of the patient deteriorates despite treatment.

#### Signs Indicating a Life-Threatening Attack

- Silent respiration sounds in auscultation
- Cyanosis
- Bradycardia or hypotension
- Exhaustion, confusion, or unconsciousness
- Arterial blood $pO_2$ <8 kPa even after breathing extra oxygen, and arterial $pCO_2$ >6 kPa.

#### Immediate Treatment

1. Put the patient in a **comfortable sitting position**, legs down if possible, so that he/she can bend forward if needed and have support for the hands and legs.
2. Give **oxygen** (usually 35% concentration is enough; in resuscitation, maximal concentration and flow) at the rate of 4 to 5 L/min either through mask or nasal cannulas.

3. Give **salbutamol aerosol** 0.1 mg/dose 4 to 8 puffs with a spacer (Cates, Crilly & Rowe, 2006; Turner et al., 1997) [**A**], or 2.5 to 10 mg with a nebulizer (or fenoterol 1.25 mg), and ipratropium bromide 0.5 mg (Stoodley, Aaron, & Dales, 1999) [**A**] nebulized (e.g., Bennet, Bird, Spira), with or without oxygen. Repeat the treatment every 20 to 30 minutes 2 to 4 times when necessary. Theophylline is not anymore recommended for routine use in the treatment of an exacerbation of asthma (Parameswaran, Belda, & Rowe, 2000) [**B**] because its effectiveness is questionable and it has adverse effects. In a severe attack, however, when intensive care should be considered, theophylline may be tried: 5 mg per kg of weight intravenously over 20 to 30 minutes, to be continued with an infusion (400 mg theophylline is diluted in 1,000 mL of 0.9% sodium chloride [NaCl] or 5% glucose solution; infusion rate is 0.6 mg/kg/hour for patients under 50 years of age and 0.4 to 0.5 mg/kg/hour to patients over 50).
4. Give a high dose of **corticosteroid** intravenously or orally (e.g., 40 to 80 mg methyl prednisolone or 125 to 250 mg hydrocortisone) (Rowe et al., "Early emergency," 2001; Manser, Reid, & Abramson, 2001; Rodrigo & Rodrigo, 1999) [**A**]. Oral corticosteroids (e.g., 30 to 40 mg prednisolone) are given independent of the intravenous steroids as soon as the patient is able to swallow.
5. Continue with oral corticosteroids (e.g., prednisolone 30 to 40 mg in the morning) for several days. If the patient has continuous corticosteroid medication at home he/she may require a higher dose.
6. In a life-threatening and severe acute asthma attack, when the bronchodilating medication does not show sufficient effect, consider magnesium sulphate 1.2 to 2 g as a slow intravenous infusion over 20 minutes (Rowe et al., 2000; Rodrigo, Rodrigo, & Burschtin, 2000) [**C**].
7. If the attack is prolonged, the patient may be dehydrated because dyspnoea prevents drinking. The patient may need **fluids** 2,000 to 3,000 mL in excess of normal diurnal need. Caution is needed with old patients and those with heart disease.

**Further Treatment**

- The patient should not be left alone until the condition has clearly improved.
- Continue oxygen therapy as needed.
- Continue oral corticosteroid therapy (e.g., 30 to 40 mg prednisolone/day) (Rowe et al., "Corticosteroids," 2001) [**A**].
- If the condition has improved, continue nebulisation treatment at 4-hour intervals.
- If the condition has not improved, repeat nebulisation treatment in 15 to 30 minutes.
- **Sedative drugs** must not be used in exacerbation of asthma, except in intensive care units.
- **Antimicrobial drugs** are not indicated if there are no signs of a bacterial infection. Patting physiotherapy is contraindicated.

**Tests and Investigations**

- PEF in the beginning of the treatment and in the follow-up
- Arterial blood gas analysis in severe conditions; repeated as needed
- Pulse oximetry (reveals hypoxia, but not hypercapnia)

- Heart rate
- Theophylline concentration in prolonged infusion
- Serum potassium and blood glucose
- Electrocardiogram (ECG) in elderly patients
- Chest x-ray in severe and poorly responding cases to exclude pneumothorax, pulmonary infiltrates, and pulmonary oedema
- Serum haematocrit, if necessary, to estimate dehydration

**Indications for Intensive Care**

- Persistent severe dyspnoea despite beta2-sympathomimetics given repeatedly 3 to 4 times at 20- to 30-min intervals.
- Arterial blood $pO_2$ is below 8 kPa despite breathing of extra oxygen
- Arterial blood $pCO_2$ is over 6 kPa
- Exhaustion
- Confusion, drowsiness
- Unconsciousness
- Respiratory arrest

**Hospital Discharge after Acute Exacerbation of Asthma**

- Pulmonary functions must be normalised before the patient is discharged
    - PEF value must be over 75% of reference value or of previous maximal value.
    - Diurnal variation in PEF must be less than 25%.
    - Nightly symptoms must be absent.
- Upon discharge, make sure that the patient has
    - An oral steroid (prednisolone 20-40 mg/day) for 1-2 weeks (Rowe et al., "Corticosteroids," 2001) [**A**]
    - An inhalable anti-inflammatory drug (usually steroid)
    - An inhalable beta sympathomimetic drug
    - Had the long-term maintenance therapy re-evaluated
    - Preferably an own PEF meter at home
    - Knowledge of the correct inhalation technique
    - An appointment for the next follow-up visit

**Related Resources**

Refer to the original guideline document for related evidence, including Cochrane reviews.

**Definitions**:

**Levels of Evidence**

A. **Quality of Evidence: High**

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- Expert opinion
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### CLINICAL ALGORITHM(S)

None provided

## EVIDENCE SUPPORTING THE RECOMMENDATIONS

### REFERENCES SUPPORTING THE RECOMMENDATIONS

References open in a new window

### TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

Concise summaries of scientific evidence attached to the individual guidelines are the unique feature of the Evidence-Based Medicine Guidelines. The evidence summaries allow the clinician to judge how well-founded the treatment recommendations are. The type of supporting evidence is identified and graded for select recommendations (see the "Major Recommendations" field).

## BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

### POTENTIAL BENEFITS

- Appropriate treatment of acute exacerbation of asthma
- The aim of treatment is

- To prevent asthma deaths
- To restore the condition and the pulmonary functions of the patient to a satisfactory level as soon as possible
- To maintain an optimal functional status and to prevent a recurrence of the exacerbation

### POTENTIAL HARMS

- Aminophylline can cause palpitations/arrhythmias and vomiting.
- In one trial minor side-effects such as flushing, mild fatigue, and burning at the intravenous site were noted in 58% of patients who received magnesium sulfate

## CONTRAINDICATIONS

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Patting physiotherapy is contraindicated.

## IMPLEMENTATION OF THE GUIDELINE

### DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

## INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

### IOM CARE NEED

Getting Better
Living with Illness

### IOM DOMAIN

Effectiveness

## IDENTIFYING INFORMATION AND AVAILABILITY

### BIBLIOGRAPHIC SOURCE(S)

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### ADAPTATION

Not applicable: The guideline was not adapted from another source.

## DATE RELEASED

2004 Apr 8 (updated 2007 Apr 11)

## GUIDELINE DEVELOPER(S)

Finnish Medical Society Duodecim - Professional Association

## SOURCE(S) OF FUNDING

Finnish Medical Society Duodecim

## GUIDELINE COMMITTEE

Editorial Team of EBM Guidelines

## COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

*Primary Author*: Timo Keistinen

## FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

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## GUIDELINE AVAILABILITY

This guideline is included in a CD-ROM titled "EBM Guidelines. Evidence-Based Medicine" available from Duodecim Medical Publications, Ltd, PO Box 713, 00101 Helsinki, Finland; e-mail: info@ebm-guidelines.com; Web site: www.ebm-guidelines.com.

## AVAILABILITY OF COMPANION DOCUMENTS

None available

## PATIENT RESOURCES

None available

## NGC STATUS

This NGC summary was completed by ECRI on September 1, 2005. This NGC summary was updated by ECRI Institute on January 8, 2008.

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